Engineered polymer-media interfaces for the long-term self-renewal of human embryonic stem cells.

Journal: Biomaterials

Publication Year: 2011

Authors: Elizabeth F Irwin, Rohini Gupta, Derek C Dashti, Kevin E Healy

PubMed link: 21774983

Funding Grants: Interdisciplinary Training in Stem Cell Biology, Engineering and Medicine

Public Summary:
We have developed a synthetic polymer interface for the long-term self-renewal of human embryonic stem cells (hESCs) in defined media. We successfully cultured hESCs on hydrogel interfaces of aminopropylmethacrylamide (APMAAm) for over 20 passages in chemically-defined mTeSR1 media and demonstrated pluripotency of multiple hESC lines with immunostaining and quantitative RT-PCR studies. Results for hESC proliferation and pluripotency markers were both qualitatively and quantitatively similar to cells cultured on Matrigel-coated substrates. Mechanistically, it was resolved that bovine serum albumin (BSA) in the mTeSR1 media was critical for cell adhesion on APMAAm hydrogel interfaces. This study uniquely identified a robust long-term culture surface for the self-renewal of hESCs without the use of biologic coatings (e.g., peptides, proteins, or Matrigel) in completely chemically-defined media that employed practical culturing techniques amenable to clinical-scale cell expansion.

Scientific Abstract:
We have developed a synthetic polymer interface for the long-term self-renewal of human embryonic stem cells (hESCs) in defined media. We successfully cultured hESCs on hydrogel interfaces of aminopropylmethacrylamide (APMAAm) for over 20 passages in chemically-defined mTeSR1 media and demonstrated pluripotency of multiple hESC lines with immunostaining and quantitative RT-PCR studies. Results for hESC proliferation and pluripotency markers were both qualitatively and quantitatively similar to cells cultured on Matrigel-coated substrates. Mechanistically, it was resolved that bovine serum albumin (BSA) in the mTeSR1 media was critical for cell adhesion on APMAAm hydrogel interfaces. This study uniquely identified a robust long-term culture surface for the self-renewal of hESCs without the use of biologic coatings (e.g., peptides, proteins, or Matrigel) in completely chemically-defined media that employed practical culturing techniques amenable to clinical-scale cell expansion.

Source URL: https://www.cirm.ca.gov/about-cirm/publications/engineered-polymer-media-interfaces-long-term-self-renewal-human-embryonic